

with the second solution comprising the second polyionic material having charges opposite of the charges of the first polyionic material.

REMARKS

In response to the Office Action dated March 26, 2002, Applicant respectfully requests reconsideration and withdrawal of the objections and rejections set-forth in the Office Action in view of the above amendments and the following remarks.

Claims 14-16 have been cancelled. Claims 1, 2, and 4-11 have been amended. Claim 17 is added. These amendments do not contain new matter and are fully supported by the specification. After these amendments are entered, fourteen (14) claims (Claims 1-13 and 17) remain pending in this application through this Amendment.

Specification Objections

Specification has been amended to incorporate all formula and to correct informalities.

Claim Objections Under 35 USC 112

Claims 1, 7, 8, and 11 have been amended to overcome the 35 U.S.C. §112, second paragraph, objections set forth in the Office Action.

Rejections Under 35 USC 102(b)

Applicants believe that a brief description of the present invention as claimed will assist the prosecution. The present invention is related to a method for modifying the surface of an article, the method comprising first functionalizing the surface of the article simply by applying one or more layers of each of one or more polyionic materials onto the surface of the article and then grafting any desired compound to the functionalized surface of the article. The Applicants' invention is partly based on the discovery that a layer of a polyionic material can be easily and stably formed on a polymeric article without any covalent attachment. Unlike plasma treatments and other techniques known in the prior art, the Applicants' invention can provide a cost-effective method for making biomedical devices such as contact lenses.

Claims 1-2, 5-6, and 12-13 were rejected under 35 USC 102(b) as being anticipated by Nakagawa et al. (US Pat. 5,409,731). The rejection over these claims is respectfully traversed for the following reasons.

Nakagawa teaches a surface modification method totally different from the Applicants' invention. In Nakagawa's method, an amino group containing polymer is cross-linked to the surface of a contact lens with the help of a cross-linking agent. In contrast to Nakagawa's method, the polyelectrolytic tie layer is not covalently attached to the surface of an article in the Applicants' invention. Furthermore, Nakagawa does not disclose or suggest anything about using of polyionic materials to functionalize the surface of an article in a non-covalent attachment manner. Applicants submit that the claimed invention are not anticipated by Nakagawa, since the cited reference teaches a surface modification totally different from the present invention as currently claimed. Applicants respectfully request withdrawal of the 35 U.S.C. §102(b) rejection.

Claims 1-2, 5-6, and 12-13 were rejected under 35 USC 102(b) as being anticipated by Wilson (U.S. Pat. 6,050,980). The rejection over these claims is respectfully traversed for the following reasons.

Wilson teaches a surface modification method totally different from the Applicants' invention. Wilson discloses a method comprising first dipping a contact lens in a solution of a crosslinking agent (hexamethylene diisocyanate) to form a tie layer and then attaching a thrombo-resistant layer (col.,7, lines 3-8). The tie layer is covalently attached to the surface of the lens. In contrast, the polyelectrolytic tie layer is not covalently attached to the surface of an article in the Applicants' invention. In addition, the crosslinking agent is not a polyionic material as required in the Applicants invention. Furthermore, Wilson does not disclose or suggest anything about using of polyionic materials to functionalize the surface of an article in a non-covalent attachment manner. Applicants submit that the claimed invention are not anticipated by Nakagawa, since the cited reference teaches a surface modification totally different from the present invention as currently claimed. Applicants respectfully request withdrawal of the 35 U.S.C. §102(b) rejection.

Claims 1-3, 5-6, and 12-15 were rejected under 35 USC 102(b) as being anticipated by Takemura et al (U.S. Pat. 4,876,126). The rejection over these claims is respectfully traversed for the following reasons.

Takemura teaches a method for forming a lubricating surface coating layer on a medical instrument. The lubricating surface coating layer is formed by covalently attaching to the medical instrument a natural water-soluble polymer or synthetic water-soluble polymer, which can be a polyionic material, for example, polyamines, poly-electrolytes, polystyrene sulfonate (col. 5, lines 4-7). Takemura does not disclose or suggest anything about using of polyionic materials to functionalize the surface of an article in a non-covalent attachment manner. Takemura teaches that when water-soluble polymers (including polyionic materials) are covalently bonded with the

↳ this is about
2nd layer,
Δ to 103, but less?

surface of a substrate a lubricating layer carried on the substrate can be obtained that is not soluble in water and offers a lasting lubricating surface. Takemura teaches away from the Applicants' invention. Applicants submit that the claimed invention are not anticipated by Takemura for the above-mentioned reasons and respectfully request withdrawal of the 35 U.S.C. §102(b) rejection.

Claims 1-4, 6, 12-13 and 15 were rejected under 35 USC 102(b) as being anticipated by Vanderlaan et al. (U.S. Pat. 6,087,415). The rejection over these claims is respectfully traversed for the following reasons.

Vanderlaan teaches that biomedical devices are coated with an antimicrobial and hydrophilic coating by using a coupling agent. In Vanderlaan's method, the biomedical devices should contain hydroxy groups, amino groups, or both on the surface. Vanderlaan teaches that if the surface material of a medical device to be coated does not contain the requisite functional groups, such groups may be incorporated into the surface material, for example, by addition of one or more functional group-containing monomers into the polymers used to form the surface (col. 2, lines 48-61). Such method for functionalizing the surface of a medical device requires polymerization (covalently attachment of monomers). Vanderlaan does not disclose or suggest anything about using of polyionic materials to functionalize the surface of an article in a non-covalent attachment manner. Therefore, Applicants submit that the claimed invention are not anticipated by Takemura and respectfully request withdrawal of the 35 U.S.C. §102(b) rejection.

Rejections Under 35 USC 103(a)

Claims 4 and 16 were rejected under 35 USC 103(a) as being unpatentable over Takemura et al. Claim 16 has been canceled, and this rejection is therefore moot with respect to this claim. The rejection over claim 4 is respectfully traversed, since, as stated above, Takemura does not disclose or suggest anything about using of polyionic materials to functionalize the surface of an article in a non-covalent attachment manner. Takemura would not teach, suggest or motivate one skilled in the art to arrive at the present invention. Applicants submit that a *prima facie* case of obviousness can not be established and request withdrawal of the 35 U.S.C. §103(a) rejection.

Claims 7-11 and 16 were rejected under 35 USC 103(a) as being unpatentable over Vanderlaan et al. Claim 16 has been canceled, and this rejection is therefore moot with respect to this claim. The rejection over claims 7-11 is respectfully traversed for the following reasons.

As discussed above, Vanderlaan does not disclose or suggest anything about using of polyionic materials to functionalize the surface of an article in a non-covalent attachment manner. Vanderlaan would not teach, suggest or motivate one skilled in the art to arrive at the present invention. Applicants submit that a *prima facie* case of obviousness can not be established and request withdrawal of the 35 U.S.C. §103(a) rejection.

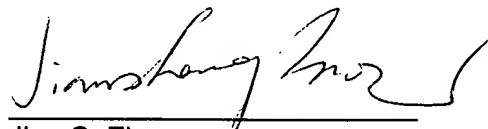
CONCLUSION

For the foregoing reasons, Applicants submit that Claims 1-13 and 17 are patentable over the cited prior art. Applicant respectfully requests reconsideration and withdrawal of the claim objections and rejections set-forth in the Office Action and allowance of claims 1-13 and 17.

Should the Examiner believe that a discussion with Applicants' representative would further the prosecution of this application, the Examiner is respectfully invited to contact the undersigned.

Please address all correspondence to Thomas Hoxie, Novartis Corporation, Patent & Trademark Department, 564 Morris Ave., Summit, NJ 0790-1027. The Commissioner is hereby authorized to charge any other fees which may be required under 37 C.F.R. §§1.16 and 1.17, or credit any overpayment, to Deposit Account No. 19-0134.

Respectfully submitted,



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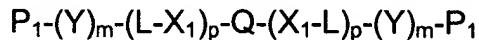
Date: Aug. 2, 2002
Novartis Corporation
Patent and Trademark Department
564 Morris Avenue
Summit, NJ 07901

Version with Markings to Show Changes Made

In the Specification:

Please amend the paragraph beginning at page 10, line 28 and ending at page 12, line 24 as follows:

Another embodiment of a suitable substrate material of the present invention is a macromer having the following general formula I:



where each P_1 , independently of the others, is a free radical-polymerizable group;

each Y , independently of the others, is -CONHCOO-,

-CONHCONH-, -OCONHCO-, -NHCONHCO-, -NHCO-, -CONH-,

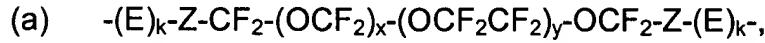
-NHCONH-, -COO-, -OCO-, -NHCOO- or -OCONH-;

m and p , independently of one another, are 0 or 1;

each L , independently of the others, is a divalent radical of an organic compound having up to 20 carbon atoms;

each X_1 , independently of the others, is -NHCO-, -CONH-, -NHCONH-, -COO-, -OCO-, -NHCOO- or -OCONH-; and

Q is a bivalent polymer fragment consisting of the segments:



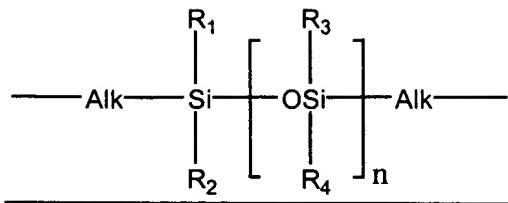
where $x+y$ is a number in the range of about 10 to about 30;

each Z , independently of the others, is a divalent radical having up to about 12 carbon atoms or Z is a bond;

each E , independently of the others, is $-(OCH_2CH_2)_q-$, where q has a value of from 0 to about 2, and where the link -Z-E- represents the sequence $-Z-(OCH_2CH_2)_q-$; and

k is 0 or 1;

(b)



where n is an integer from about 5 to about 100;

Alk is alkylene having up to about 20 carbon atoms;

about 80% to about 100% of the radicals R_1 , R_2 , R_3 and R_4 , independently of one another, are alkyl and 0 to about 20% of the radicals R_1 , R_2 , R_3 and R_4 , independently of one another, are alkenyl, aryl or cyanolkyl; and

(c) X_2-R-X_2 ,

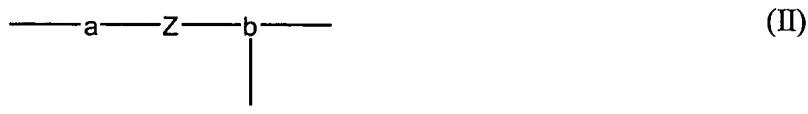
where R is a divalent organic radical having up to 20 carbon atoms; and

each X_2 , independently of the others, is $-NHCO-$, $-CONH-$, $-NHCONH-$, $-COO-$, $-OCO-$, $-NHCOO-$, or $OCONH-$;

with the provisos that there is typically at least one of each segment (a), (b), and (c) in Q, that each segment (a) or (b) has a segment (c) attached to it, and that each segment (c) has a segment (a) or (b) attached to it.

Please amend the paragraph beginning at page 14, line 4 and ending at page 15, line 3 as follows:

The polymers of this embodiment can be formed by polymerizing a macromer comprising at least one segment having the following general formula (II):



in which,

(a) is a polysiloxane segment,

(b) is a polyol segment which contains at least 4 carbon atoms,

Z is a segment (c) or a group X₁, and

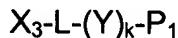
(c) is defined as X₂-R-X₂, wherein

R is a bivalent radical of an organic compound having up to 20 carbon atoms and

each X₂ independently of the other is a bivalent radical which contains at least one carbonyl group,

X₁ is defined as X₂, and

(d) is a radical having the following general formula (III):



in which, P₁ is a group that can be polymerized by free radicals;

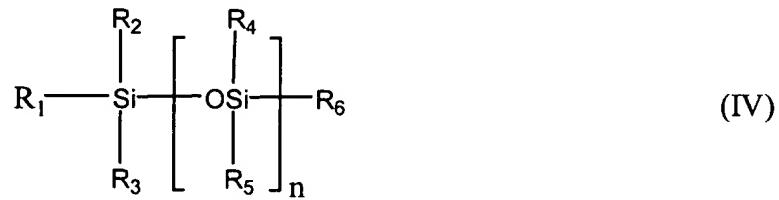
Y and X₃ independently of one another are a bivalent radical which contains at least one carbonyl group;

k is 0 or 1; and

L is a bond or a divalent radical having up to 20 carbon atoms of an organic compound.

Please amend the paragraph beginning at page 15, line 4 and ending at page 15, line 25 as follows:

In one embodiment, a polysiloxane segment (a) can be derived from a compound having the following general formula (IV):



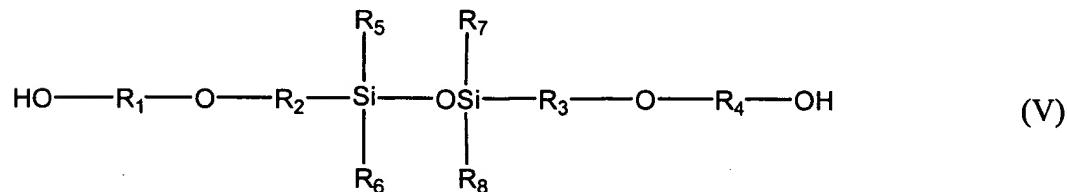
in which, n is an integer from 5 to 500;

25%-99.8% of the radicals R₁, R₂, R₃, R₄, R₅, and R₆ independently of one another are alkyl and 0.2%-75% of the radicals R₁, R₂, R₃, R₄, R₅, and R₆ independently of one another are partly fluorinated alkyl, aminoalkyl, alkenyl, aryl, cyanoalkyl, alk-NH-alk-NH₂ or alk-(OCH₂)_m-(OCH₂)_p-OR₇,

where R₇ is hydrogen or lower alkyl, alk is alkylene, and m and p independently of one another are an integer from 0 to 10, one molecule containing at least one primary amino or hydroxyl group.

Please amend the paragraph beginning at age 16, line 7 and ending at page 16, line 22 as follows:

Another embodiment of a substrate material of the present invention involves the polymerization of a siloxane-containing macromer formed from a poly(dialkylsiloxane) dialkoxyalkanol having the following structure (V):



where n is an integer from about 5 to about 500, preferably about 20 to about 200, more preferably about 20 to about 100;

the radicals R₁, R₂, R₃, and R₄, independently of one another, are lower alkylene, for example a C₁-C₆ alkylene, C₁-C₃ alkylene, and wherein, in some embodiments, the total number of carbon atoms in R₁ and R₂ or in R₃ and R₄ is greater than 4; and

R₅, R₆, R₇, and R₈ are, independently of one another, lower alkyl, in some embodiments, a C₁-C₆ alkyl, and in some embodiments, a C₁-C₃ alkyl.

Please amend the paragraph bridging page 20 and page 21 as follows:

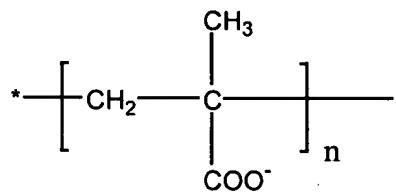
The anionic polymer may be linear or branched polyacrylic acid or an acrylic acid copolymer, such as a linear or branched polyacrylic acid. A branched polyacrylic acid in this context is to be understood as

meaning a []polyacrylic acid
 obtainable by []polymerizing acrylic
 acid in the []presence of suitable
 (minor) amounts of []a di- or polyvinyl
 compound.

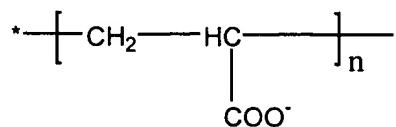
Please amend the paragraph beginning at page 21, line 6 to page 22, line 14 as follows:

Suitable []polyanionic material may be any material known in the art to have a plurality of negatively charged groups along a polymer chain. For example, suitable anionic materials can include, but are not limited to:

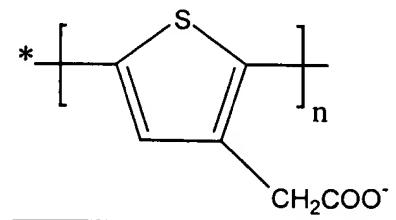
(a) polymethacrylic acid (PMA)



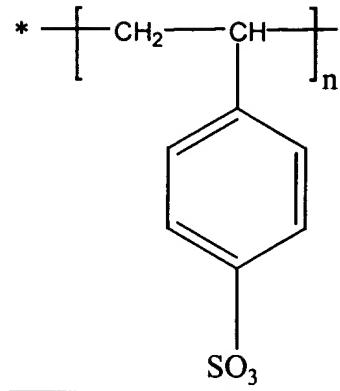
(b) polyacrylic acid (PAA)



(c) poly(thiophene-[]3-acetic acid) (PTAA)



(d) poly(4-styrenesulfonic acid) (PSS) or sodium poly(styrene sulfonate) (SPS) or poly(sodium styrene sulfonate) (PSSS)

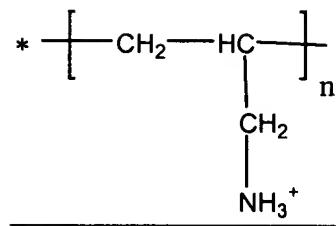


Please amend the paragraph at page 22, lines 15-24 as follows:

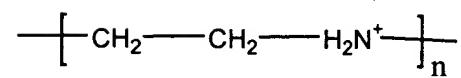
A suitable cationic substance may be any material known in the art to have a plurality of positively charged groups along a polymer chain. A cationic polymer may, for example, be a synthetic polymer, a biopolymer or modified biopolymer comprising primary, secondary or tertiary amino groups or a suitable salt thereof, preferably an ophthalmically acceptable salt thereof when []ophthalmic devices are to be coated, for []example, a hydrohalogenide, []such as a hydrochloride thereof, in the []backbone or as substituents.

Please amend the paragraph beginning at page 22, line 25 to page 24, line 21 as follows:

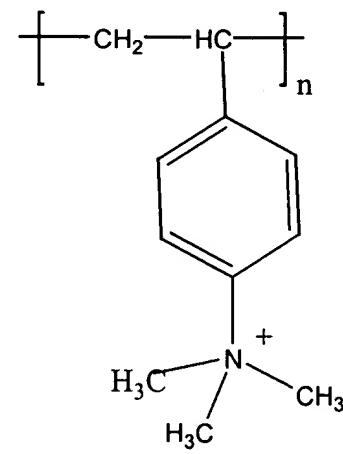
Various []cationic materials can include, but are not limited to:
(a) poly(allylamine hydrochloride) (PAH)



[](b)
 []poly(ethyleneimine) (PEI)

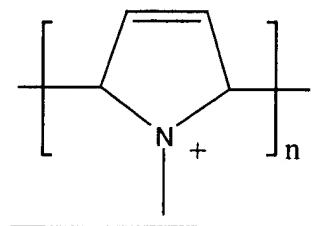


(c) poly(vinylbenzyltrimethylamine) (PVBT)

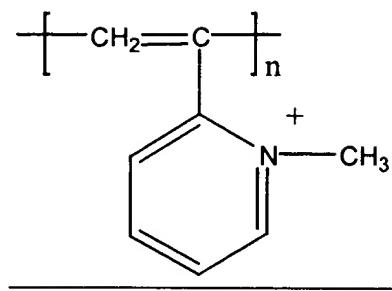


(d) polyaniline (PAN or PANI) (p-type doped) [or sulphonated polyaniline]

(e) polypyrrole (PPY) (p-[]typed doped)

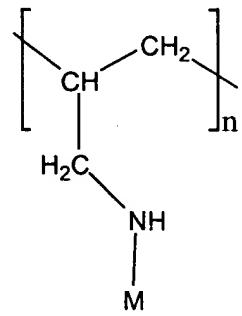


(f) poly(pyridinium []acetylene)



Please amend the paragraph bridging page 24 and page 25 as follows:

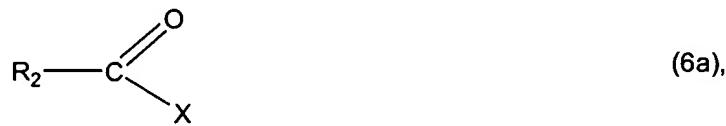
In certain embodiments, either the polyanionic or polycationic material can be made from derivatives of a polyallyl amine having a weight average molecular weight of at least 2000 that, based on the number of amino groups of the polyallyl amine, comprises from approximately 1 to 99% of units having the following formula (1):

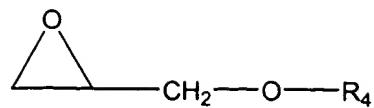


wherein M is a "modifier unit". For instance, in one embodiment, the modifier unit, M, can be R-C=O, where R is C₂-C₆ alkyl that is substituted by two or more same or different substituents selected from the group consisting of hydroxy, C₂-C₅ alkanoyloxy, and C₂-C₅ alkylamino carbonyloxy. Preferably, R is linear C₃-C₆ alkyl, more preferably linear C₄-C₅ alkyl, and most preferably n-pentyl that is in each case substituted as defined above.

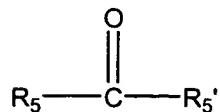
Please amend the paragraph beginning at page 27, line 19 and ending at page 29, line 7 as follows:

Polyallyl amines comprising additional "modifier units", M, may be prepared by adding to the reaction a mixture of the polyallyl amine and the compound of formula (6), simultaneously or preferably successively. Some examples of compounds that can be added to a polyallyl amine and the compound of formula (6) include, but are not limited to, the following:





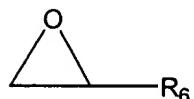
(6f),



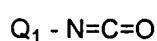
(6g),



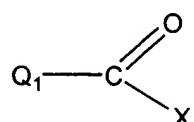
(6h),



(6i),

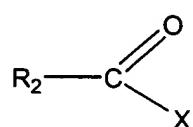


(6j), or

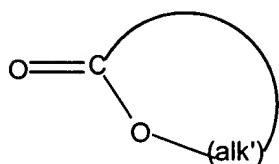


(6k),

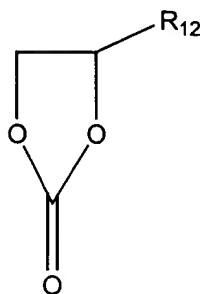
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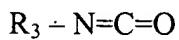
(6a),



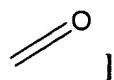
(6b),



(6c),



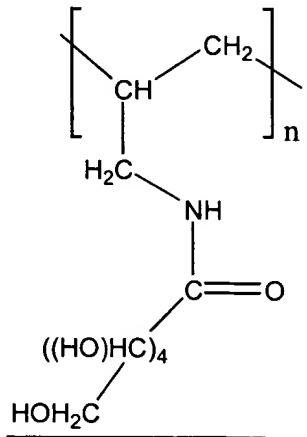
(6d),



- wherein X is halogen, preferably chlorine; (alk') is C₁-C₁₂-alkylene; R₁₂ is hydrogen or C₁-C₂-alkyl, preferably hydrogen or methyl; and R₃, R₄, R₅', R₆ and Q₁ are as defined above. The reaction proceeds, for example, in an aqueous solution at room temperature or at an elevated temperature, such as from 25°C []to about 60°C, and yields various []polymers comprising various modifier []units.

Please amend the last paragraph at page 29, line 8 to the last line as follows:

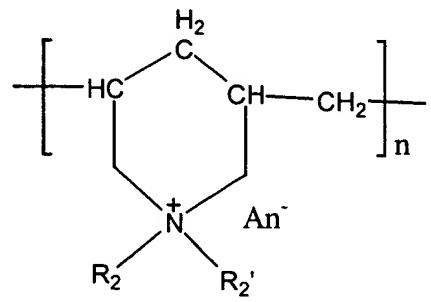
Because the []reaction of the amino groups of []the polyallyl amine with the compounds of []formulae (6) or (6a)-(6k) proceeds, in []general, quantitatively, the structure of the[]modified polymers is determined mainly []by the stoichiometry of the reactants that []are employed into the reaction. A particular polyionic material is polyallylamine gluconolactone, as shown below in formula (7):



Please amend the paragraph beginning at page 30, line 4 and ending at page 31, line 13 as follows:

Further examples of synthetic cationic polymers useful in forming the tie layers of the present invention include:

- (i) a polyallylamine (PAH) homo- or copolymer, optionally comprising modifier units as described herein;
- (ii) a polyethyleneimine (PEI) as discussed above;
- (iii) a polyvinylamine homo- or copolymer, optionally comprising modifier units;
- (iv) a poly(vinylbenzyl-tri-C₁-C₄-alkylammonium salt), for example a poly(vinylbenzyl-tri-methyl ammoniumchloride);
- (v) a polymer of an aliphatic or araliphatic dihalide and an aliphatic N,N,N',N'-tetra-C₁-C₄-alkyl-alkylenediamine, for example a polymer of (a) propylene-1,3-dichloride or -dibromide or p-xylylene dichloride or dibromide and (b) N,N,N',N'-tetramethyl-1,4-tetramethylene diamine;
- (vi) a poly(vinylpyridin) or poly(vinylpyridinium salt) homo- or copolymer;
- (vii) a poly (N,N-diallyl-N,N-di-C₁-C₄-alkyl-ammoniumhalide) comprising units of formula



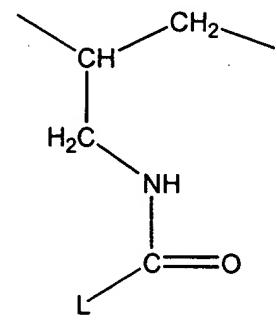
wherein R₂ and R_{2'} are each independently C₁-C₄-alkyl, in particular methyl, and An⁻ is a, for example, a halide anion such as the chloride anion;

- (viii) a homo- or copolymer of a quaternized di-C₁-C₄-alkyl-aminoethyl acrylate or methacrylate, for example a poly(2-hydroxy-3-methacryloylpropyltri-C₁-C₂-alkylammonium salt) homopolymer such as a poly(2-hydroxy-3-methacryloylpropyltri-methylammonium chloride), or a quaternized poly(2-dimethylaminoethyl methacrylate) or a quaternized poly(vinylpyrrolidone-co-2-dimethylaminoethyl methacrylate);

- (ix) POLYQUAD® as disclosed in EP-A-456,467; or
- (x) a polyaminoamide (PAMAM), for example a linear PAMAM or a PAMAM dendrimer such as a amino-terminated Starburst™ PAMAM dendrimer (Aldrich).

Please amend the paragraph beginning at page 31, line 22 and ending at page 32, line 7 as follows:

Suitable modifier units of the polyallylamine (i) are, for example, of formula



[

](5),

wherein L is C₂-C₆-alkyl which is substituted by two or more same or different substituents selected from the group consisting of hydroxy, C₂-C₅-alkanoyloxy and C₂-C₅-alkylamino-carbonyloxy.

L may be linear C₃-C₆-alkyl, such as linear C₄-C₅-alkyl, or, more particularly, n-pentyl which is in each case substituted as defined above.

Please amend the paragraph beginning at page 32, line 16 and ending at page 33, line 7 as follows:

A particular embodiment relates to polyallyl amines comprising units of the above formula (5), wherein L is a radical of formula

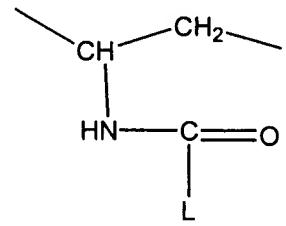


[(6),]

wherein g is 1, 2, 3, 4 or 5, preferably 3 or 4 and in particular 4, each R* is independently hydrogen or a radical -C(O)-R₂₉ or -C(O)-NH-R_{29'}, and for R₂₉ and R_{29'} the above meanings and preferences apply. L is even more preferred a radical of the above formula (6) wherein g is 3 or 4, in particular 4, and each group -OR* independently is hydroxy or hydroxy which is partly or completely acetylated, in particular hydroxy. Particular preferred radicals L are 1,2,3,4,5-pentahydroxy-n-pentyl or 1,2,3,4,5-pentahydroxy-n-pentyl wherein the hydroxy groups are partly or completely acetylated.

Please amend the paragraph bridging page 33 and page 34 as follows:

Suitable modifier units of the polyvinylamine (iii) are, for example, of formula



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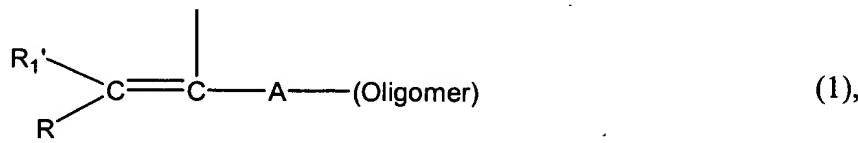
](5a),

wherein for L the above-given meanings and preferences apply.

A suitable polyvinylamine copolymer is, for example, a copolymer comprising vinylamine units and units derived from another hydrophilic comonomer, for example from acrylamide, N,N-dimethyl acrylamide, N-vinylpyrrolidone or the like.

Please amend the paragraph beginning at page 47, line 28 and ending at page 51, line 11 as follows:

A hydrophilic surface may be created on the substrate in accordance with the present invention by using any suitable macromonomer such as, for example, a macromonomer having the formula

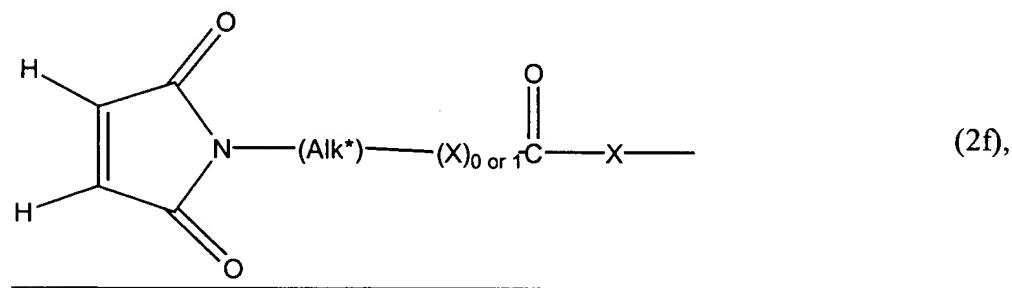


[(1),]

wherein R₁ is hydrogen, C₁-C₆-alkyl or a radical -COOR'; R, R' and R₁' are each independently of the other hydrogen or C₁-C₆-alkyl; A is a direct bond or is a radical of formula

- C(O)-(A₁)_n-X- (2a) or
- (A₂)_m-NH-C(O)-X- (2b); or
- (A₂)_m-X-C(O)- (2c); or
- C(O)-NH-C(O)-X- (2d); or
- C(O)-X₁-(alk^{*})-X-C(O)- (2e); or

A and R₁, together with the adjacent double bond, are a radical of formula



[(2f),]

A₁ is -O-C₂-C₁₂-alkylene which is unsubstituted or substituted by hydroxy, or is -O-C₂-C₁₂-alkylene-NH-C(O)- or -O-C₂-C₁₂-alkylene-O-C(O)-NH-R₁₁-NH-C(O)-, wherein

R₁₁ is linear or branched C₁-C₁₈-alkylene or unsubstituted or C₁-C₄-alkyl- or C₁-C₄-alkoxy-substituted C₆-C₁₀-arylene, C₇-C₁₈-aralkylene, C₆-C₁₀-arylene-C₁-C₂-alkylene-C₆-C₁₀-arylene, C₃-C₈-cyclo-alkylene, C₃-C₈-cycloalkylene-C₁-C₆-alkylene, C₃-C₈-cycloalkylene-C₁-C₂-alkylene-C₃-C₈-cyclo-alkylene or C₁-C₆-alkylene-C₃-C₈-cycloalkylene-C₁-C₆-alkylene;

A₂ is C₁-C₈-alkylene; phenylene or benzylene;

m and n are each independently of the other the number 0 or 1;

X, X₁ and X' are each independently of the other a bivalent group -O- or -NR'', wherein R'' is hydrogen or C₁-C₆-alkyl;

(alk*) is C₂-C₁₂-alkylene;

and (oligomer) denotes

(i) the radical of a telemor of formula



wherein (alk) is C₂-C₁₂-alkylene,

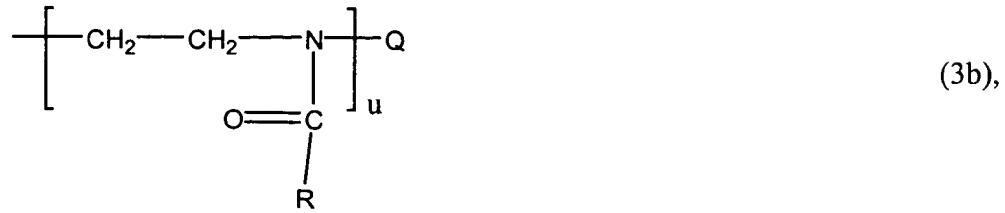
Q is a monovalent group that is suitable to act as a polymerization chain-reaction terminator,

p and q are each independently of another an integer from 0 to 250,

wherein the total of (p+q) is an integer from 2 to 250,

and B and B' are each independently of the other a 1,2-ethylene radical derivable from a copolymerizable vinyl monomer by replacing the vinylic double bond by a single bond, at least one of the radicals B and B' being substituted by a hydrophilic substituent; or

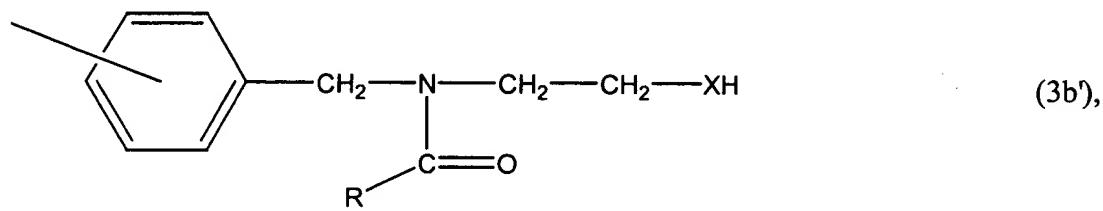
(ii) the radical of an oligomer of the formula



[(3b),]

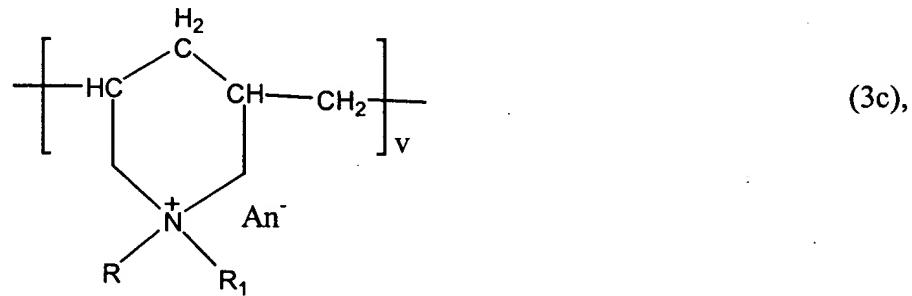
wherein R_{28} is hydrogen or unsubstituted or hydroxy-substituted C₁-C₁₂-alkyl, u is an integer from 2 to 250 and Q' is a radical of a polymerization initiator; or

(iii) the radical of formula



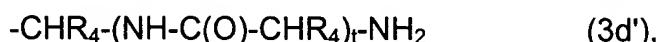
[(3b')] wherein R_{28} , X and u are as defined above, or

(iv) the radical of an oligomer of formula



[(3c)] wherein R_2 and R_2' are each independently C₁-C₄-alkyl, An^- is an anion, v is an integer from 2 to 250, and Q'' is a monovalent group that is suitable to act as a polymerization chain-reaction terminator; or

(v) the radical of an oligopeptide of formula



wherein R_4 is hydrogen or C₁-C₄-alkyl which is unsubstituted or substituted by hydroxy, carboxy, carbamoyl, amino, phenyl, o-, m- or p-hydroxyphenyl, imidazolyl, indolyl or a radical -NH-C(=NH)-NH₂ and t is an integer from 2 to 250, or the radical of an oligopeptide based on proline or hydroxyproline; or

(vi) the radical of a polyalkylene oxide of formula



wherein R₃₀ is hydrogen or C₁-C₂₄-alkyl, (alk^{**}) is C₂-C₄-alkylene, z is 0 or 1, r and s are each independently an integer from 0 to 250 and the total of (r+s) is from 2 to 250; or

(vii) the radical of an oligosaccharide;

subject to the provisos that

A is not a direct bond if (oligomer) is a radical of formula (3a);

A is a direct bond if (oligomer) is a radical of formula (3b');

A is not a radical of formula (2c) or (2e) if (oligomer) is a radical of formula

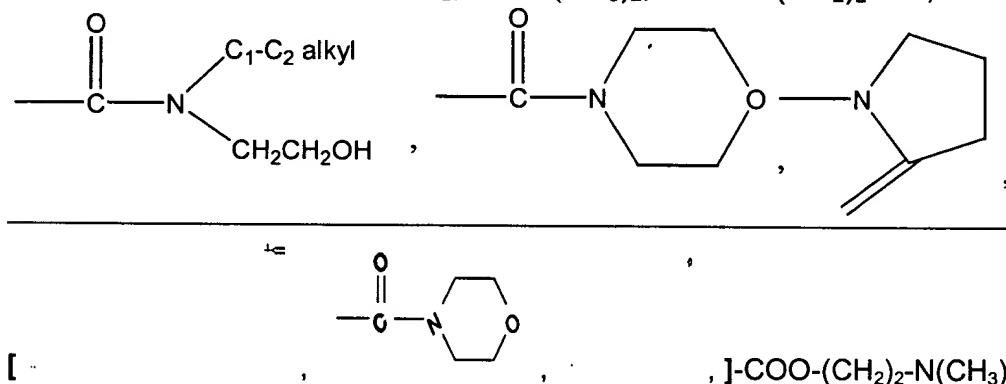
(3b), (3c), (3d), (3e) or is the radical of an oligosaccharide; and

A is a radical of formula (2c) or (2e) if (oligomer) is a radical of formula

(3d').

Please amend the first paragraph on page 61, lines 1-4 as follows:

A particularly preferred group of non-ionic substituents of B or B' comprises the radicals -CONH₂, -CON(CH₃)₂, -CONH-(CH₂)₂-OH,



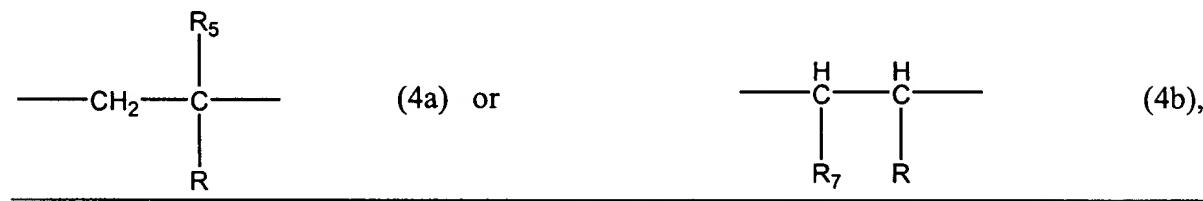
and -COO(CH₂)₂₋₄-NHC(O)-O-G wherein -O-G is the radical of trehalose.

Please amend the paragraph beginning at page 63, line 25 and ending at page 64, the last line as follows:

In one embodiment of the invention one of B and B' may also be the radical of a hydrophobic comonomer which includes especially those customarily used in the manufacture of contact lenses. Suitable hydrophobic vinylic comonomers include, without the list being exhaustive

- acrylonitrile, methacrylonitrile, vinyl-C₁-C₁₈-alkanoates, C₂-C₁₈-alkenes, C₂-C₁₈-haloalkenes, styrene, C₁-C₆-alkylstyrene, C₂-C₁₀-perfluoroalkyl
- acrylates and methacrylates or correspondingly partially fluorinated acrylates and methacrylates, C₃-C₁₂-perfluoroalkyl-ethyl-thio-carbonylaminooethyl acrylates and methacrylates, acryloxy- and methacryloxy-alkyl-sil-oxanes, N-vinylcarbazole and the like. Examples of suitable hydrophobic vinylic comonomers include acrylonitrile, methacrylonitrile, vinyl acetate, vinyl propionate, vinylbutyrate, vinyl valerate, styrene, chloroprene, vinyl chloride, vinylidene chloride, 1-butene, butadiene, vinyltoluene, perfluorohexylethylthiocarbonylaminooethyl methacrylate, trifluoroethyl methacrylate, hexafluoroisopropyl methacrylate, hexafluorobutyl methacrylate, tris-trimethylsilyloxy-silyl-propyl methacrylate, 3-methacryloxypropylpentamethyl-disiloxane and bis(methacryloxypropyl)tetramethyldisiloxane.

B denotes for example a radical of formula



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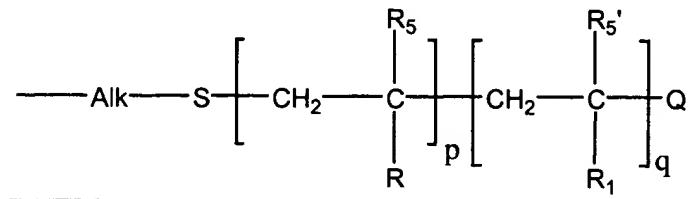
(4a) or

(4b),]

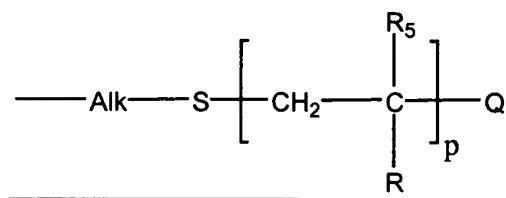
wherein R₅ is hydrogen or C₁-C₄-alkyl, preferably hydrogen or methyl; R₆ is a hydrophilic substituent, wherein the above given meanings and preferences apply; R₇ is C₁-C₄-alkyl, phenyl or a radical -C(O)OY₉, wherein Y₉ is hydrogen or unsubstituted or hydroxy-substituted C₁-C₄-alkyl; and R₈ is a radical -C(O)Y₉' or -CH₂-C(O)OY₉' wherein Y₉' independently has the meaning of Y₉.

Page 65, please amend the paragraph beginning at page 65, line 11 and ending at page 66, line 2 as follows:

If (oligomer) is a telomer radical of formula (3a), the radical -(alk)-S-[B]_p-[B']_q-Q preferably denotes a radical of formula



(3a') and even more preferably of the formula



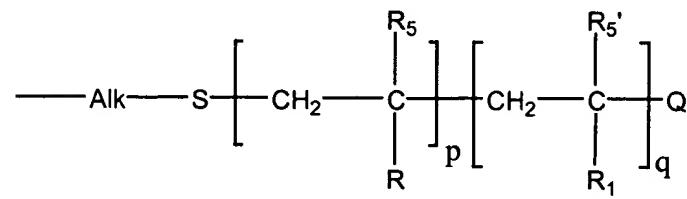
(3a'')

wherein for R₅, R₆, Q, p and q the above-given meanings and preferences apply, for R_{5'} independently the meanings and preferences given before for R₅ apply, and for R_{6'} independently the meanings and preferences given before for R₆ apply or R_{6'} is a hydrophobic substituent selected from the group consisting of hydrogen, -CN, C₁-C₁₈-alkanoyl, C₁-C₁₆-alkyl, C₁-C₁₆-haloalkyl, phenyl, C₁-C₆-alkylphenyl, C₂-C₁₀-perfluoroalkyloxycarbonyl or a corresponding partially fluorinated alkyloxycarbonyl radical, C₃-C₁₂-perfluoroalkyl-ethyl-thiocarbonylaminoethoxyethoxycarbonyl, alkylsiloxyloxycarbonyl and carbazolyl .

Please amend the paragraph beginning at page 66, line 3 and ending at page 67, line 10 as follows:

A preferred group of suitable hydrophilic macromers according to the invention comprises compounds of the above formula (1) wherein R is hydrogen or methyl, R₁ is hydrogen, methyl or carboxyl, R_{1'} is hydrogen, A is a radical of the above formula (2a), (2b) or (2e), wherein n and m are

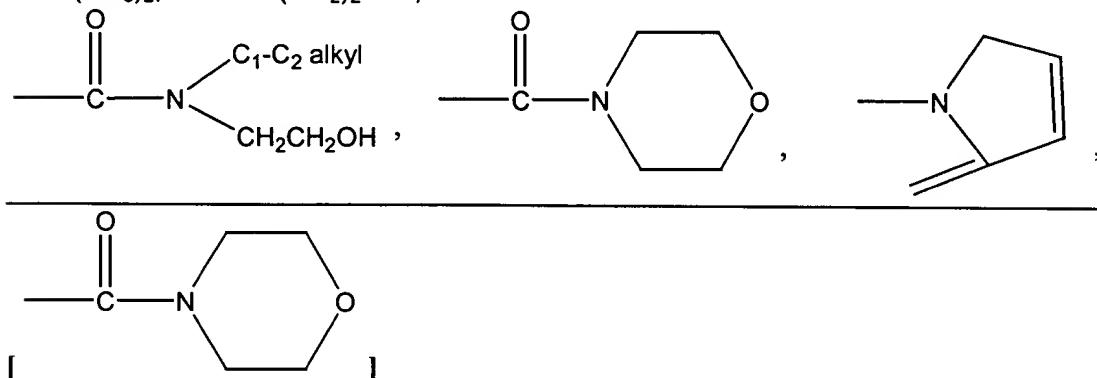
- each 0 or 1, X and X_1 are each independently of the other -O- or -NH-, A_1 is unsubstituted or hydroxy-substituted -O-C₂-C₈-alkylene or a radical -O-C₂-C₆-alkylene-NH-C(O)-, A_2 is C₁-C₄-alkylene, phenylene or [or] benzylene, (alk*) is C₂-C₄-alkylene, and (oligomer) denotes a radical of formula



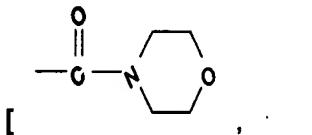
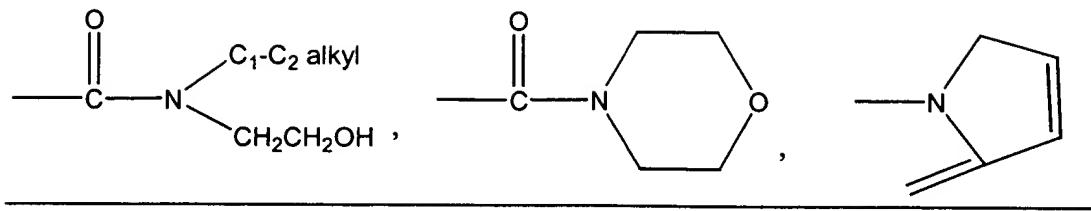
(3a'),

wherein (alk) is C₂-C₆-alkylene, Q is a monovalent group that is suitable to act as a polymerization chain-reaction terminator, p and q are each an integer of from 0 to 100 and the total of (p+q) is from 5 to 100, R₅ and R_{5'} are each independently of the other hydrogen or methyl, and for R₆ and R_{6'} each independently of the other the meanings and preferences given before apply. One particularly preferred embodiment of the above outlined hydrophilic macromers comprises those wherein q is 0, p is from 5 to 100, R₅ is hydrogen or methyl, and R₆ is a radical -CONH₂, -

CON(CH₃)₂, -CONH-(CH₂)₂-OH,



[] -COO-(CH₂)₂-N(CH₃)₂, or -COO(CH₂)₂₋₄-NHC(O)-O-G wherein -O-G is the radical of trehalose. A further preferred embodiment of the above outlined hydrophilic macromers comprises those wherein p is from 4 to 99, q is from 1 to 96 wherein in the total of (p+q) is from 5 to 100, R₅ and R_{5'} are each independently hydrogen or methyl, R₆ is a radical -CONH₂, -CON(CH₃)₂, -CONH-(CH₂)₂-OH,

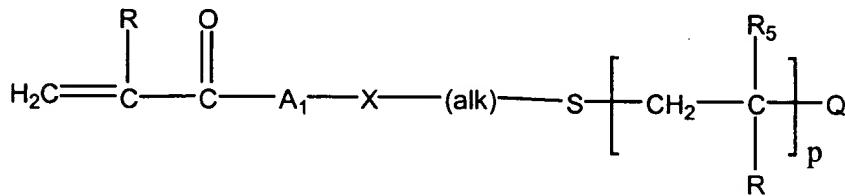


,]-COO-(CH₂)₂-N(CH₃)₂, or

-COO(CH₂)₂₋₄-NH-C(O)-O-G wherein -O-G is the radical of trehalose, and R₆' independently has the meaning of R₆ or is carboxy, subject to the proviso that R₆ and R₆' are different.

Please amend the last paragraph at page 67, lines 11-19 as follows:

A more preferred group of suitable hydrophilic macromonomers according to the invention comprises compounds of formula

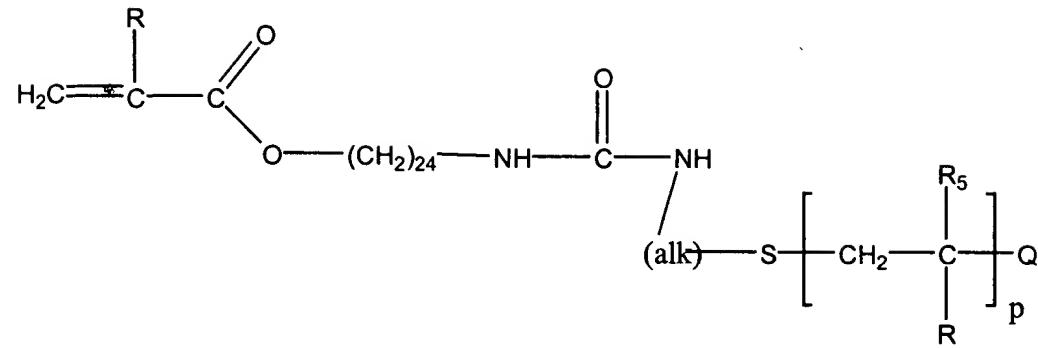


(1a),

wherein R is hydrogen or methyl, A₁ is -O-(CH₂)₂₋₄-, -O-CH₂-CH(OH)-CH₂- or a radical -O-(CH₂)₂₋₄-NH-C(O)-, X is -O- or -NH-, (alk) is C₂-C₄-alkylene, Q is a monovalent group that is suitable to act as a polymerization chain-reaction terminator, p is an integer from 5 to 50, R₅ is hydrogen or methyl, and for R₆ the above given meanings and preferences apply.

Please amend the first paragraph at page 68, lines 1-10 as follows:

_____ A particularly preferred embodiment of the invention relates to hydrophilic macromonomers of the formula



(1b),
 wherein for R, R₅, R₆, Q, (alk) and p the above-given meanings and preferences apply. A particularly preferred group of hydrophilic macromonomers are compounds of the above formula (1b) wherein R is hydrogen or methyl, (alk) is C₂-C₄-alkylene, R₅ is hydrogen or methyl, p is an integer of 5 to 50, Q is as defined before, and for R₆ the above given meanings and preferences apply.

In the claims:

Please amend claims 1, 2, and 4-11 as follows:

1. (Amended) A method for modifying the surface of an article, said method comprising the steps of:

a) depositing at least a [partially functionalized] polyelectrolytic tie layer onto the surface of said article, wherein said polyelectrolytic tie layer is composed of (i) one layer of a first polyionic material which is not covalently attached to the surface of the article or (ii) at least one layer of the first polyionic material which is not covalently attached to the surface of the article and at least one layer of a second polyionic material having charges opposite of the charges of the first polyionic material, wherein said first and second polyionic materials have functional groups which provide [so as to create a surface having] reactive sites for the further attachment of various active agents to the surface of the article; and

b) [chemically attaching]grafting a layer of an active agent to said reactive sites.

2. (Amended) The method of claim 1 wherein said [chemical attaching]grafting step is effected by a method chosen from the group consisting of precipitation reactions, covalent reactions, hydrogen bonding, and polymerization reactions.

4. (Amended) The method of claim 1 wherein in the step of depositing two or more [said] polyelectrolytic tie layers [is] are successively deposited onto said article surface [by applying successive electrolytic tie layers].

5. (Amended) The method of claim 1 wherein in the step of depositing one [said] polyelectrolytic tie layer is deposited onto said article surface [by a single coating application].

6. (Amended) The method of claim 1 wherein said polyelectrolytic tie layer is deposited onto said article surface by [dipping]contacting said article with one or more polyionic material solutions.

7. (Amended) The method of claim 6 wherein said layer is deposited by dipping said article into a first solution comprising [a] the first polyionic [moiety]material having [a] positive or [a] negative charges, removing said article from said first solution, dipping said article into a second solution comprising [a] the second polyionic [moiety]material having [a] charges that [is]are opposite [from said first solution]of the charges of the first polyionic material, and removing said article from said second solution.

8. (Amended) The method of claim 6 wherein said polyelectrolytic tie layer is deposited onto said article surface by dipping said article into a solution comprising [polyionic moieties of different charges]the first polyionic material and the second polyionic material and then removing said article from said solution.

9. (Amended) The method of claim 1]6 wherein [said polyelectrolytic tie layer is deposited onto said article surface by spraying] said contacting occurs by spraying a solution onto the medical device.

10. (Amended) The method of claim 9 wherein said polyelectrolytic tie layer is deposited by spraying said article with a first solution comprising the first polyionic material having positive or negative charges [a polyionic moiety having a positive or a negative charge] and then spraying said article with a second solution comprising the second polyionic material having charges opposite of the charges of the first polyionic material [a polyionic moiety having a charge that is opposite from said first solution].

11. (Amended) The method of claim 9 wherein said polyelectrolytic tie layer is deposited onto said article surface by spraying said article with a solution comprising the first polyionic material and the second polyionic material [polyionic moieties of different charges].